NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Ligustrum ovalifolium	USDA Plants Code: LIOV
Common names:	California privet	
Native distribution:	Japan	
Date assessed:	February 11, 2009; edited March 17, 2010	
Assessors:	Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	March 17, 2010	Form version date: 22 October 2008

New York Invasiveness Rank: Low (Relative Maximum Score 40.00-49.99)

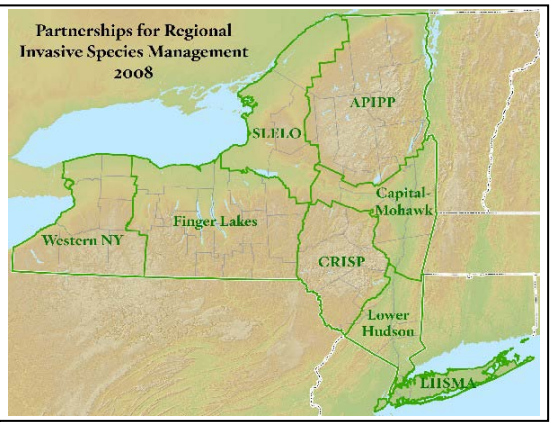
Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Restricted	Low
6	Lower Hudson	Not Assessed	Not Assessed
7	Saint Lawrence/Eastern Lake Ontario	Not Assessed	Not Assessed
8	Western New York	Not Assessed	Not Assessed

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	9
2	Biological characteristic and dispersal ability	25 (22)	16
3	Ecological amplitude and distribution	25 (25)	11
4	Difficulty of control	10 (10)	3
	Outcome score	100 (87)[b]	39[a]
	Relative maximum score †		44.83
	New York Invasiveness Rank §	Low (Relative Maximum Score 40.00-49.99)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)	
☒	Yes – continue to A1.2
☐	No – continue to A2.1
A1.2. In which PRISMs is it known (see inset map)?	
☐	Adirondack Park Invasive Program
☐	Capital/Mohawk
☐	Catskill Regional Invasive Species Partnership
☐	Finger Lakes
☒	Long Island Invasive Species Management Area
☒	Lower Hudson
☐	Saint Lawrence/Eastern Lake Ontario
☐	Western New York



Documentation:
Sources of information:
Weldy & Werier, 2008; Brooklyn Botanic Garden, 2009.

A2.1. What is the likelihood that this species will occur and persist outside of cultivation, given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form)

Not Assessed	Adirondack Park Invasive Program
Not Assessed	Capital/Mohawk
Not Assessed	Catskill Regional Invasive Species Partnership
Not Assessed	Finger Lakes
Very Likely	Long Island Invasive Species Management Area
Not Assessed	Lower Hudson
Not Assessed	Saint Lawrence/Eastern Lake Ontario
Not Assessed	Western New York

Documentation:
Sources of information (e.g.: distribution models, literature, expert opinions):
Brooklyn Botanic Garden, 2009.

If the species does not occur and is not likely to occur with any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank *from PRISM invasiveness ranking forms*)

	Distribution
Adirondack Park Invasive Program	Not Assessed
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Restricted
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:
Weldy & Werier, 2008; Brooklyn Botanic Garden, 2009.

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	Wetland Habitats	Upland Habitats
☐ Salt/brackish waters	☐ Salt/brackish marshes	☒ Cultivated*
☐ Freshwater tidal	☐ Freshwater marshes	☒ Grasslands/old fields
☐ Rivers/streams	☐ Peatlands	☐ Shrublands
☐ Natural lakes and ponds	☐ Shrub swamps	☒ Forests/woodlands
☐ Vernal pools	☐ Forested wetlands/riparian	☐ Alpine
☐ Reservoirs/impoundments*	☐ Ditches*	☒ Roadsides*
	☐ Beaches and/or coastal dunes	

Other potential or known suitable habitats within New York:

Documentation:
Sources of information:
Brooklyn Botanic Garden, 2009.

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years.	0
B.	Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
C.	Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl)	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)	10
U.	Unknown	

Score 3

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Maybury (2006): "No evidence of significant impacts on abiotic processes." Dense growth clearly limits light availability to layers below thus influencing ecosystem processes to a minor degree. More studies needed on the effects of this plant to ecosystem processes and system-wide parameters.
Sources of information:
Maybury, 2006; author's pers. obs.

1.2. Impact on Natural Community Structure

A.	No perceived impact; establishes in an existing layer without influencing its structure	0
B.	Influences structure in one layer (e.g., changes the density of one layer)	3
C.	Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
D.	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below)	10
U.	Unknown	

Score 3

Documentation:
Identify type of impact or alteration:
Can form rather dense stands that alter the density of the shrub layer. No evidence that there is a major alteration of structure or significant impact in layer (e.g., creation of new layer or elimination of an exisiting layer).
Sources of information:
Maybury, 2006; author's pers. obs.

1.3. Impact on Natural Community Composition

A.	No perceived impact; causes no apparent change in native populations	0
B.	Influences community composition (e.g., reduces the number of individuals in one or more native species in the community)	3
C.	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)	7
D.	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards	10

species exotic to the natural community)

U. Unknown

Score 3

Documentation:
Identify type of impact or alteration:
Species can reduce reduce population sizes of native shrub species. No evidence of significant or major alterations of populations.
Sources of information:
Weber, 2003; Maybury, 2006; author's pers. obs.

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A.	Negligible perceived impact	0
B.	Minor impact	3
C.	Moderate impact	7
D.	Severe impact on other species or species groups	10
U.	Unknown	

Score U

Documentation:
Identify type of impact or alteration:
Studies on impacts to other species groups not done (Maybury, 2006). Flowers are pollinated by many insects (author's obs.). Genus banned in New Zealand where it has been reported to cause asthma and eczema in some people (Swearingen et al., 2002).
Sources of information:
Swearingen et al., 2002; Maybury, 2006; author's pers. obs.

Total Possible 30

Section One Total 9

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction (provisional thresholds, more investigation needed)

A.	No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction).	0
B.	Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction)	1
C.	Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented)	2
D.	Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.)	4
U.	Unknown	

Score 2

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Charlie Scheer: "Few fruits were observed on older minimally managed hedges [pruned

once a year; Andy Senesac pers. comm.]. Little regrowth noted. One hedge about ¼ mile long, which is over 10 year old, had only none or 1-2 fruits per plant. This hedge had heavily flowered in the spring. It is adjacent to large wood land, no seedlings were observed under the hedge, in the adjacent unmaintained grassy areas, or in the woodland. " Scheer's observations correspond to Wyman's (1956) observations at the Arnold Arboretum (Boston) that fruits were seldom produced." However, at Brooklyn Botanic Garden, specimens (quite old) produce abundant seeds (over 1000s per plant). Genus generally vegetatively spreads through root suckering, but Charlie Scheer noted that there is limited vegetative spread of this species on Long Island . Material at Mashomack Preserve with abundant fruit may represent this species or a hybrid with this species; further study needed.
Sources of information:
Batcher, 2000; Charlie Scheer, pers. obs.; author's pers. obs.

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

A.	Does not occur (no long-distance dispersal mechanisms)	0
B.	Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations)	1
C.	Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant)	2
D.	Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant)	4
U.	Unknown	

Score 2

Documentation:
Identify dispersal mechanisms:
Moderate opportunities for long distance dispersal as birds eat the fruits, but fruit is not always abundantly set.
Sources of information:
Miller, 2003; Maybury, 2006; author's pers. obs.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

A.	Does not occur	0
B.	Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient)	1
C.	Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent)	2
D.	High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful)	3
U.	Unknown	

Score 3

Documentation:
Identify dispersal mechanisms:
Introduced into U.S. for hedgerow plantings. Commonly used for that purpose today. Voss (1996) reported seeing the plant in an area where fill was placed -- evidence for indirect transport. The plant probably has a greater potential for spread in the lower PRISMs (LIISMA, Lower Husdon).
Sources of information:
Maybury, 2006; author's pers. obs.

2.4. Characteristics that increase competitive advantage, such as shade tolerance,

ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 3
C. Possesses two or more characteristics that increase competitive advantage 6
U. Unknown

Score 6

Documentation:
Evidence of competitive ability:
Perennial, able to grow on infertile soils.
Sources of information:
Maybury, 2006; author's pers. obs.

2.5. Growth vigor

A. Does not form thickets or have a climbing or smothering growth habit 0
B. Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms 2
U. Unknown

Score 0

Documentation:
Describe growth form:
While it forms dense hedgrows in cultivation, it has not been shown to form thickets (or smothering growth in the wild).
Sources of information:
Maybury, 2006; author's pers. obs.

2.6. Germination/Regeneration

A. Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules. 0
B. Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions 2
C. Can germinate/regenerate in existing vegetation in a wide range of conditions 3
U. Unknown (No studies have been completed)

Score U

Documentation:
Describe germination requirements:
Germination requirements in the field not known.
Sources of information:

2.7. Other species in the genus invasive in New York or elsewhere

A. No 0
B. Yes 3
U. Unknown

Score 3

Documentation:
Species:
Ligustrum obtusifolium. Weldy & Werier, 2009; Brooklyn Botanic Garden, 2009.

Total Possible 22
Section Two Total 16

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: "The part of the United States covered extends from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

A.	No large stands (no areas greater than 1/4 acre or 1000 square meters)	0
B.	Large dense stands present in areas with numerous invasive species already present or disturbed landscapes	2
C.	Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas)	4
U.	Unknown	

Score 0

Documentation:
Identify reason for selection, or evidence of weedy history:
Large stands over 1/4 acre not known.
Sources of information:
Maybury, 2006; author's pers. obs.

3.2. Number of habitats the species may invade

A.	Not known to invade any natural habitats given at A2.3	0
B.	Known to occur in two or more of the habitats given at A2.3, with at least one a natural habitat.	1
C.	Known to occur in three or more of the habitats given at A2.3, with at least two a natural habitat.	2
D.	Known to occur in four or more of the habitats given at A2.3, with at least three a natural habitat.	4
E.	Known to occur in more than four of the habitats given at A2.3, with at least four a natural habitat.	6
U.	Unknown	

Score 2

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.3.
Sources of information:
Brooklyn Botanic Garden, 2009.

3.3. Role of disturbance in establishment

A.	Requires anthropogenic disturbances to establish.	0
B.	May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances.	2
C.	Can establish independent of any known natural or anthropogenic disturbances.	4
U.	Unknown	

Score 2

Documentation:
Identify type of disturbance:
Readily establishes in areas with natural or anthropogenic disturbance; not known to require anthropogenic disturbance.
Sources of information:
Maybury, 2006; author's pers. obs.

3.4. Climate in native range

A.	Native range does not include climates similar to New York	0
B.	Native range possibly includes climates similar to at least part of New York.	1
C.	Native range includes climates similar to those in New York	3
U.	Unknown	

Score: 1

Documentation:
Describe what part of the native range is similar in climate to New York:
Temperate Asia but not likely to survive in northern portions of New York.
Sources of information:
Brooklyn Botanic Garden, 2009.

3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope)

A.	Not known from the northeastern US and adjacent Canada	0
B.	Present as a non-native in one northeastern USA state and/or eastern Canadian province.	1
C.	Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces.	2
D.	Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 1 northeastern state or eastern Canadian province.	3
E.	Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 2 northeastern states or eastern Canadian provinces.	4
U.	Unknown	

Score: 4

Documentation:
Identify states and provinces invaded:
CT, DC, DE, KY, MA, MD, MI, MO, NJ, OH, PA, VA; Ontario
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
U.S.D.A., 2009.

3.6. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

A.	Present in none of the PRISMs	0
B.	Present in 1 PRISM	1
C.	Present in 2 PRISMs	2
D.	Present in 3 PRISMs	3
E.	Present in more than 3 PRISMs or on the Federal noxious weed lists	4
U.	Unknown	

Score: 2

Documentation:
Describe distribution:
See A1.1.
Sources of information:
Weldy & Werier, 2008; Brooklyn Botanic Garden, 2009.

Total Possible	25
Section Three Total	11

4. DIFFICULTY OF CONTROL

4.1. Seed banks

A. Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules. 0

B. Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years 2

C. Seeds (or vegetative propagules) remain viable in soil for more than 10 years 3

U. Unknown

Score 0

Documentation:
Identify longevity of seed bank:
Panetta (2009): "Seeds of both broad-leaved and small-leaved privets appear to be relatively short-lived. In the first trial, there was a flush of emergence in the first few months (winter and spring) following sowing, with no further seedlings emerging after 7 months for broadleaved privet and 5 months for small-leaved privet." Rehder (1922) reported that Ligustrum seeds could be propagated from seeds sown in the fall and noted that some would not germinate until the following season. No evidence that seeds persist longer than one year. Daniel Ryniec, curator of BBG's lilac collection, has made similar observations in the closely related lilacs (Syringa).
Sources of information:
Rehder, 1922; Penetta, 2009.

4.2. Vegetative regeneration

A. No regrowth following removal of aboveground growth 0

B. Regrowth from ground-level meristems 1

C. Regrowth from extensive underground system 2

D. Any plant part is a viable propagule 3

U. Unknown

Score 1

Documentation:
Describe vegetative response:
Regrowth can occur from ground level meristems.
Sources of information:
Maybury, 2006.

4.3. Level of effort required

A. Management is not required: e.g., species does not persist without repeated anthropogenic disturbance. 0

B. Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft^2). 2

C. Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1 acre infestation. Eradication is difficult, but possible (infestation as above). 3

D. Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10 person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1 acre infestation. Eradication may be impossible (infestation as above). 4

U. Unknown

Score 2

Documentation:
Identify types of control methods and time-term required:

Maybury (2006):" Foliar herbicides or cutting and manually applying herbicide to the stump should be effective where management is needed (see Batcher 2000)." Detailed control measures not published. Populations reported are not large and any management should be relatively easy and inexpensive.
Sources of information:
Batcher, 2000; Randall & Marinelli, 2003; Tomaino, 2004

Total Possible	10
Section Four Total	3
Total for 4 sections Possible	87
Total for 4 sections	39

C. STATUS OF CULTIVARS AND HYBRIDS:

At the present time (May 2008) there is no protocol or criteria for assessing the invasiveness of cultivars independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol will likely require data on cultivar fertility and identification in both experimental and natural settings.

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Some cultivars of the species known to be available: 'Aureo-marginata' (='Aureum')

References for species assessment:

Batcher, M. S. 2000. Element stewardship abstract for Ligustrum spp. Privet. The Nature Conservancy, Arlington, Virginia.

Brooklyn Botanic Garden. 2009. AILANTHUS database. [Accessed on February 11, 2009.]

Campbell, F. No date. Worst Invasive Plant Species in the Conterminous United States that are sold by the Nursery Trade. American Lands Alliance, Washington, DC. <americanlands.org/gardeners_and_invasive_plants.htm> [Accessed February 11, 2009].

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Flint, H. L. 1983. Landscape plants for eastern North America. John Wiley & Sons, New York. 677 pp.

Ladd, D. and B. Churchwell. 1999. Ecological and floristic assessment of Missouri Prairie Foundation lands. The Nature Conservancy, Missouri Field Office, St. Louis. <moprairie.org/floristic/index.html>

Little, E.L., Jr. 1979. Checklist of United States trees (native and naturalized). Agriculture Handbook No. 541. U.S. Forest Service, Washington, D.C. 375 pp.

Maybury, K.. 2006. Ligustrum ovalifolium. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed on February 11, 2009.]

Mehrhoff, L.J., J.A. Silander, Jr., S.A. Leicht and E. Mosher. 2003. IPANE: Invasive Plant Atlas of New England. Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT. <invasives.eeb.uconn.edu/ipane/> [Accesse Februaruy 11, 2009.]

Miller, J.H. 2003. Nonnative Invasive Plants of Southern Forests: A field guide for identification and control. Gen. Tech. Rep. SRS-62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 pp.

Panetta, D. 2009. Ecology and management of environmental weeds in south-eastern Queensland. <cbit.uq.edu.au/biocontrol/pest_plant_management/weeds_in_seq.htm>. [Accessed February 11, 2009].

Rehder, A. H. 1922. Ligustrum. Pp. 1859-1862 in L. H. Bailey, The Standard Cyclopedia of Horticulture. Macmillan Co., London. Vol. IV. 2421. pp.

Rhoads, A.F., and W.M. Klein, Jr. 1993. The vascular flora of Pennsylvania: Annotated checklist and atlas. American Philosophical Society, Philadelphia, PA. 636 pp.

Stace, C. 1997. New Flora of the British Isles. Second edition. Cambridge University Press, Cambridge, UK.

Swearingen, J., K. Reshetiloff, B. Slattery, and S. Zwicker (2002). Privets. Plant Invaders of Mid-Atlantic Natural Areas. National Park Service and U.S. Fish & Wildlife Service. <nps.gov/plants/alien/pubs/midatlantic/ligu.htm> [Accessed February 11, 2009.].

Tennessee Exotic Pest Plant Council (TNEPPC). 2001. Invasive Exotic Plants in Tennessee. First revision of Feb. 1995 list. <www.se-eppc.org/states/TN/TNIList.html> [Accessed February 11, 2009.]

United States Department of Agriculture, National Resources Conservation Service. 2009. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana [Accesssed on February 11, 2009.]

Voss, E.G. 1996. Michigan Flora. Part III. Dicots (Pyrolaceae-Compositae). Cranbrook Institute of Science Bulletin 61 and Univ. Michigan Herbarium. Ann Arbor, Michigan. 622 pp.

Weber, E. 2003. Invasive plant species of the world: a reference guide to environmental weeds. CABI Publishing, Cambridge, Massachusetts. 548 pp.

Weldy, T. and D. Werier. 2009 New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), Florida Center for Community Design and Research. University of South Florida]. New York Flora Association, Albany, New York.

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NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY. Note that the order of authorship is alphabetical; all three authors contributed substantially to the development of this protocol.

Acknowledgments: The NY form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Long Island Invasive Species Management Area's Scientific Review Committee were incorporated in revisions of this form. Original members of the LIISMA SRC included representatives of the Brooklyn Botanic Garden; The Nature Conservancy; New York Natural Heritage Program, New York Sea Grant; New York State Office of Parks, Recreation and Historic Preservation; National Park Service; Brookhaven National Laboratory; New York State Department of Environmental Conservation Region 1; Cornell Cooperative Extension of Suffolk/Nassau Counties; Long Island Nursery and Landscape Association; Long Island Farm Bureau; SUNY Farmingdale Ornamental Horticulture Department; Queens College Biology Department; Long Island Botanical Society; Long Island Weed Information Management System database manager; Suffolk County Department of Parks, Recreation and Conservation; Nassau County Department of Parks, Recreation and Museums; Suffolk County Soil & Water Conservation District.

References for ranking form:

Carlson, Matthew L., Irina V. Lapina, Michael Shephard, Jeffery S. Conn, Roseann Densmore, Page Spencer, Jeff Heys, Julie Riley, Jamie Nielsen. 2008. Invasiveness ranking system for non-native plants of Alaska. Technical Paper R10-TPXX, USDA Forest Service, Alaska Region, Anchorage, AK XX9. Alaska Weed Ranking Project may be viewed at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

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